Systems Integration Working Group: SYERS-2 via MOBSTR/FOL Modeling & Simulation

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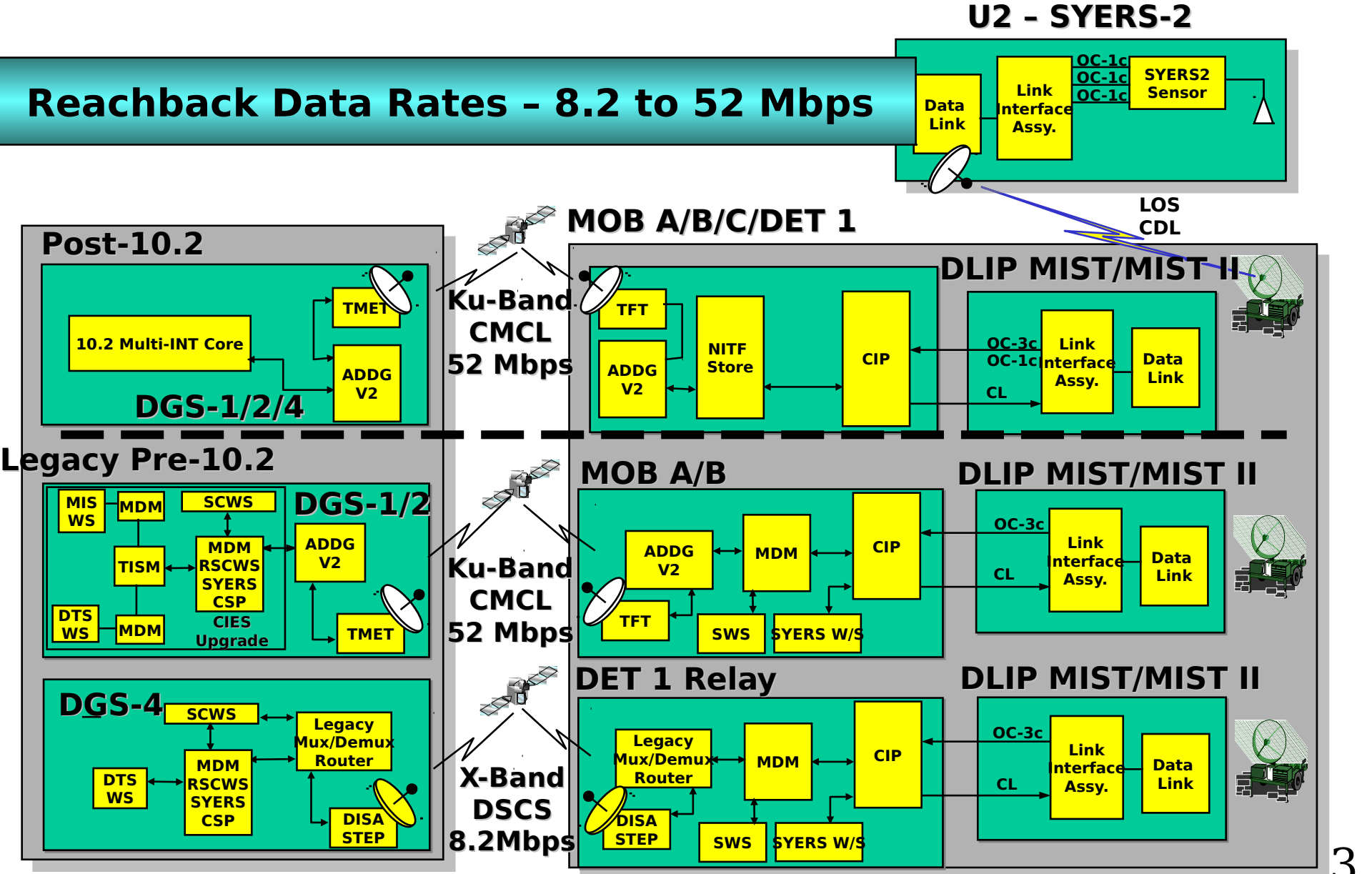
SYERS-2 over MOBSTR/FOL

- **Issue/Risk: Timelines to exploit SYERS-2 via MOBSTR/FOL unacceptable to users**
- **Impact: Full SYERS-2 capabilities not realized due to image latency concerns**
- **Discussion:**
  - SYERS-2 file sizes larger than legacy SYERS
  - Users requested help utilizing SYERS-2 over MOBSTR/FOL
- **Way Ahead: (Near Term—w/o added bandwidth)**
  - Model/Simulation: predict latency due to various tasking strategies, image compression, transmission queue management schemes
  - Testing: playback of SYERS-2 data over MOBSTR link
  - Training: new sensor capabilities, tasking modes
- **Long Term: Identify req'd bandwidth for SYERS-2 through simulation & SYERS-2 thread analysis**

SYERS-2 Reachback Threads

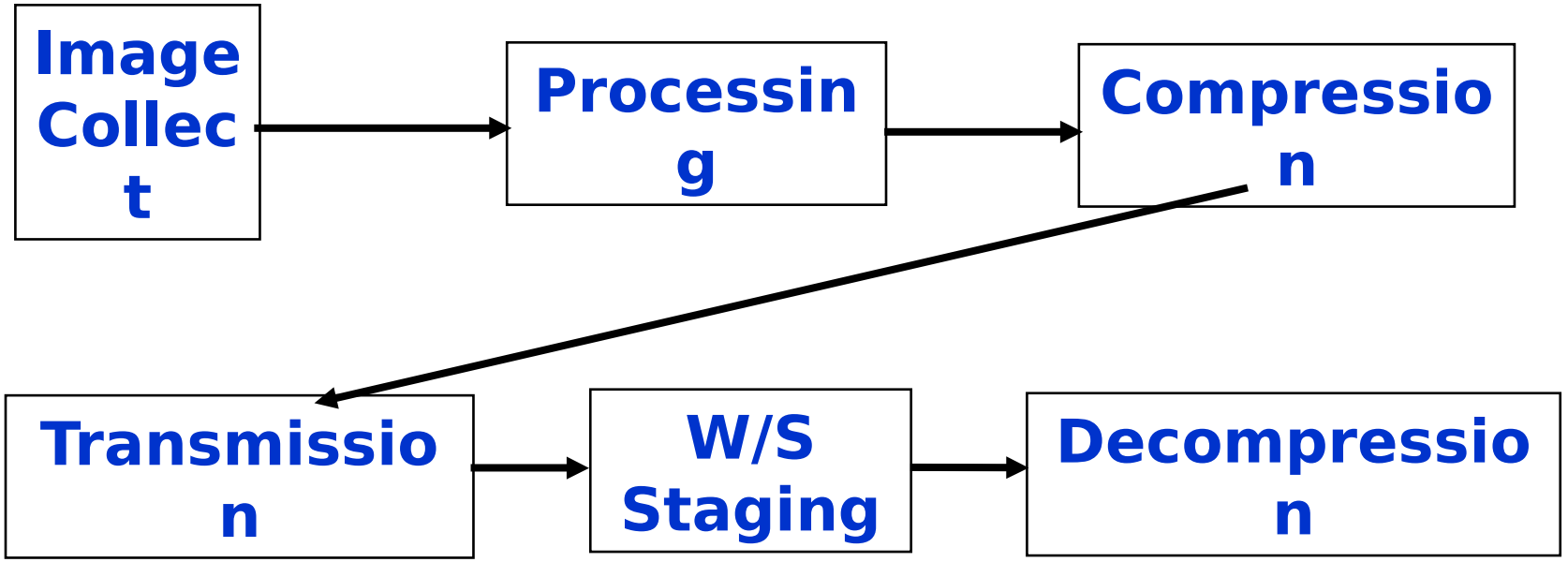
Reachback Data Rates – 8.2 to 52 Mbps



Modeling & Simulation

- **Simple, analytical model built to predict image latency under real-world loading and bandwidths**
- **Model validated utilizing data from 2002 ETP SYERS-2 O-6 decision briefing**
  - Within ~10 seconds
- **Driven by image collection data**
  - Time of collect, imaging mode
  - Can utilize actual SYERS & SYERS-2 collection plans, or artificial plans
- **Key variables in model:**
  - Image compression ratio, processing times, Tx bandwidth & efficiency
- **Outputs:**
  - Predicted latency of images from ground terminal receipt to exploitation workstation under nominal loading conditions
  - Discreet (each image latency) & statistical (mean, 90%-ile, maximum) quantitative analysis

Current Model Elements

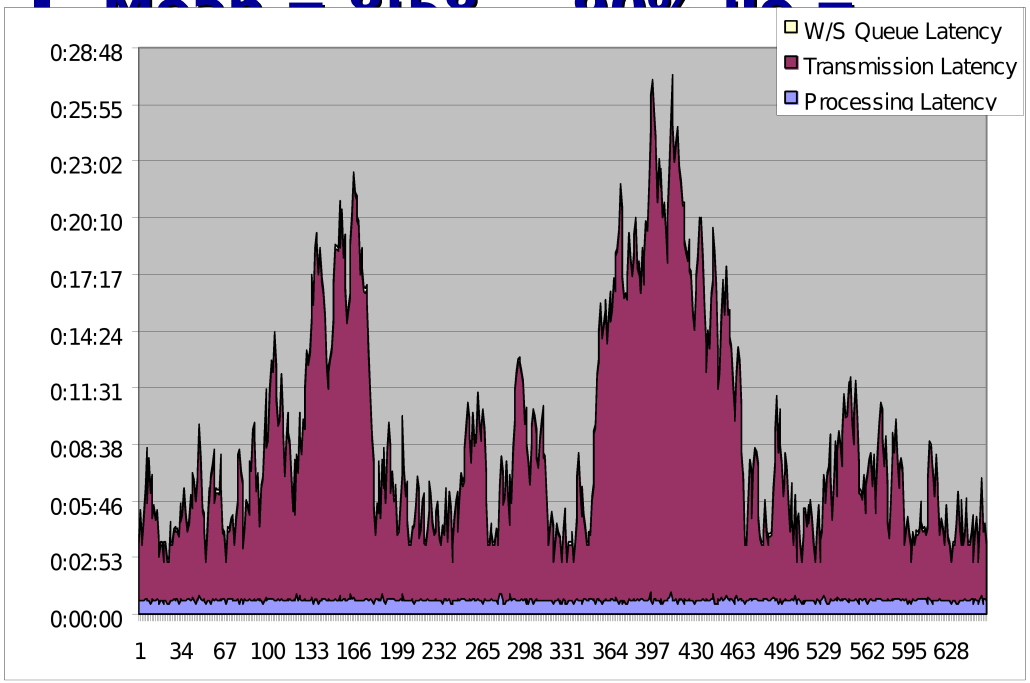


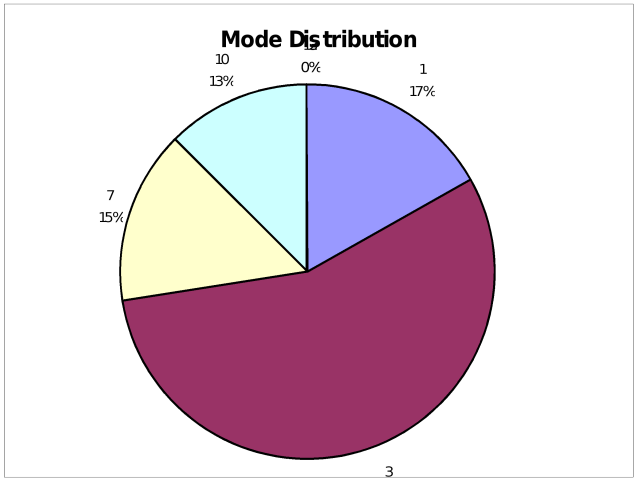
Modeling & Simulation (cont)

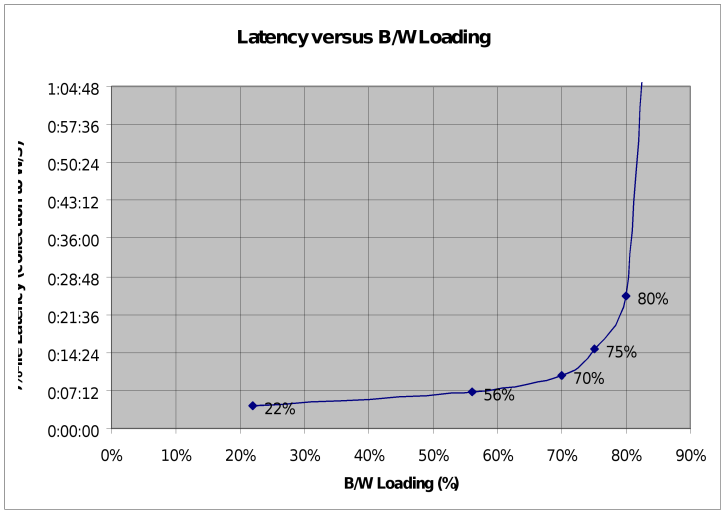
- **Status:**
  - Preliminary model constructed & sent out for review
  - Artificial image collection generator built
  - Request for actual SYERS & SYERS-2 queue data made through CFSR (Goodrich)
- **Next steps:**
  - Continue model thread analysis with Goodrich engineering
  - Populate model with actual SYERS & SYERS-2 collection data
  - Run baseline SYERS & SYERS-2 data through model for FOL configuration (Best & Worst cases)
  - Run scenarios: compression, bandwidth expansion, altered SYERS-2 collection schemes (Optimize to find ‘acceptable’ latency)

Modeling & Simulation (cont)

- **Example:**
  - Target Density: 20 images/hr
  - Compression 3:1
  - Bandwidth 8Mb/s w/ 20% O/H
- **Mean = 8:58 90% ile =**







Testing Timeline

- **Jun 04**
  - U-2 Integrated Test Team Reviewed Draft Plan
  - Draft Plan Distributed to ITT Members for Initial Comments
- **Jul 04**
  - Comments Received and are Being Incorporated
  - Plan Changes Required Based Upon ESC/LX Discussions
- **Aug 04**
  - Draft Plan to be Distributed for Final Comments
  - Complete Plan Coordination
  - Complete M&S and Tape Playback
- **Sep 04**
  - Complete Draft CONOPS
  - Conduct OT&E Flights to Verify SYERS-2/MOBSTR CONOPS
  - Draft Technical Recommendations for Increasing Data Throughput

Aggressive Timeline Required to Meet Projected Sensor Movements